

# THE CHIHUAHUAN DESERT SPECIES OF ERICAMERIA (COMPOSITAE: ASTEREA)

LOWELL E. URBATSCH

Department of Botany

Louisiana State University, Baton Rouge, LA. 70803

The purpose of this paper is to treat the Chihuahuan Desert species of *Ericameria* in advance of the flora being prepared for that region by M. C. Johnston et al. In this report one new combination is made and the taxonomy and distribution of the other four indigenous species are given. I concur with taxonomists who give *Ericameria* generic status (e.g. Johnston, 1970) rather than with those who treat it as a section in the genus *Haplopappus* (e.g. Hall, 1928). *Ericameria* comprises ca. 20 species of shrubs (Urbatsch, ined.), and California is its center of greatest species diversity.

The Chihuahuan Desert species of *Ericameria* are novelties. They stand apart from one another and from their California relatives in that each has a unique flavonoid complement and one or more extraordinary morphological features (Urbatsch, ined.). However, two characters, their zygomorphic disk corollas and their relatively long, thick style branches, give the Chihuahuan Desert species unity. Perhaps the pattern of diversity expressed by these species suggests that they are relicts that evolved from a common extinct ancestral group which also gave rise to the California species. Alternatively, the Chihuahuan Desert species may be recent evolutionary products that rapidly evolved in response to drastically changing environmental conditions. Certainly, the apparent morphological and chemical remoteness among the Chihuahuan Desert species and between them and the other *Ericamerias* offers a challenge to cladistic formulation.

*Ericameria* is closely allied with the genus *Chrysothamnus*, and it is often confused with the genera *Isocoma* and *Xanthocephalum*. Morphological features that distinguish the four genera are given in Table I.

## Key to Species of Chihuahuan Desert *Ericameria*

1. Leaves acicular, non-resinous; ray flowers absent. . . . . 5. *E. purpusii*.
1. Leaves linear, not rigid and needle-like, usually resinous; ray flowers absent or present.
  2. Ray flowers present; heads with 7 or more flowers; phyllaries imbricate.
    3. Middle and upper phyllaries elliptic to obovate with a green to tan subapical patch.
      4. Leaves widely spaced, internodes 5-12 mm long, stems appearing "leafless"; heads with 7-14 flowers. . . . . 1. *E. pseudobaccharis*.
      4. Leaves crowded, internodes 1-4 mm long, stems leafy; heads with ca. 30 flowers. . . . . 2. *E. parrasana*.
    3. Middle phyllaries subulate with medial, prominent, dark-colored costa. . . . . 3. *E. laricifolia*.
  2. Ray flowers absent; heads with 3-7 flowers; phyllaries in subvertical files. . . . . 4. *E. triantha*.

## Taxonomic Treatment

1. **ERICAMERIA pseudobaccharis** (Blake) Urbatsch, comb. nov.—*Haplopappus pseudobaccharis* Blake, J. Wash. Acad. Sci. 40:47. 1950. TYPE: MEXICO: Coahuila: arid limestone hillside, Valle Seco, Sierra de la Paila, General Cepeda, 4 July 1944, G. B. Hinton et al. 16546 (HOLOTYPE, US!; ISOTYPES, GH!, NY!)

*Ericameria pseudobaccharis* is known only from south central Coahuila, 1200-1500 m; it apparently flowers when conditions are favorable.

*Ericameria pseudobaccharis* was placed in synonymy with *E. triantha* by Johnston (1970) who had only limited material available. This species remained relatively unknown until James Hendrickson and co-workers rediscovered it at several different localities in Coahuila. The morphological range of variation for *E. pseudobaccharis* and *E. triantha* is now better understood and they are readily distinguishable. In *E. pseudobaccharis* the heads are solitary or disposed in racemes, radiate, 7-14 flowered, and have imbricate phyllaries, whereas in *E. triantha* the heads are in cymose clusters, eradiate, 3-7 flowered, and have phyllaries in subvertical files. The two taxa have only one flavonoid in common while they differ in twelve

TABLE 1. Comparison of Key Morphological Features that Distinguish *Ericameria* from Similar Genera.

Genus	<i>Ericameria</i>	<i>Chrysothamnus</i>	<i>Isocoma</i>	<i>Xanthocephalum</i>
Character				
leaf margins	entire	entire	serrate, lobed or entire	entire
phyllary arrangement	imbricate to sub-vertical files	vertical files	imbricate	imbricate
disk corolla tubes	gradually ampliate	gradually ampliate	abruptly inflated	gradually ampliate
pappus	bristles	bristles	bristles	scales or absent
heads	discoïd or radiate	discoïd	discoïd	radiate

compounds (Urbatsch, ined.). The species are adapted to different habitats, *E. pseudobaccharis* occurs on limestone slopes and sometimes in gypseous areas, while *E. triantha* is commonly found in gypseous soils on desert flats.

Additional specimens examined: MEXICO: Coahuila, ca. 18 (air) mi NE of Tlahualilo, in Sierra de Tlahualilo, ca. 9 mi NW of Los Charcos de Risa, on small limestone peak, ca. 1.5 mi E of main peak, 30 Sep 173, *Hendrickson 13720* (LL); ca. 32 (air) mi NE of Tlahualilo, in the NW portion of the Sierra de las Delicias, in the first canyon south of the Puerto de las Sardines, on limestone, infrequent, 9 Aug 1973, *Hendrickson 12216* (LL); ca. 67 (air) mi SW of Cuatro Ciénegas, 1.5 mi SW of Las Delicias in E side of Sierra de las Delicias, 15 Aug. 1973, *Hendrickson 12467* (LL); ca. 62 (air) mi WSW of Cuatro Ciénegas, on N side of Sierra de los Organos, about 5 (air) mi SW of Cuestade Gallo, 8 Aug 1973, *Hendrickson 12110* (LL); ca. 9.2 (rd) mi S of El Hundido, in Izotal, frequent, 29 Sep. 1973, *Hendrickson 1376a* (LL).

2. **ERICAMERIA PARRASANA** Blake, Contr. Gray Herb. 52:26. 1917. TYPE: MEXICO: Coahuila, rocky slopes, Sierra de Parras, March 1905, *Purpus 1005* (HOLOTYPE, UC!; ISOTYPE, GR!).—*Haplopappus parrasanus* (Blake) Blake Contr. U.S. Natl. Herb. 23:1490. 1926.

*Ericameria parrasana* is known only from the rather obscure type locality and the one cited below. It apparently flowers when conditions are favorable.

Additional specimens examined: MEXICO: ZACATECAS: 2 km S of San Miguel on road to Cedros, 24° 55' 50"N, 102° 07'W, 1570m; 1 Jul 1973, *Johnston, Wendt & Chiang 11542* (LL); same location as preceding; 22 Aug 1974, *Urbatsch et al. 1942* (LSU).

*Ericameria parrasana* was known only from the type collection until recently rediscovered by M. C. Johnston. Hall (1928) maintained that *E. parrasana* and *Haplopappus linearifolius* comprise *Haplopappus* sect. *Stenotopsis*, which Hall regarded as remote from sect. *Ericameria*. In my judgment both species in *Stenotopsis* belong to *Ericameria*. Although *E. parrasana* and *H. linearifolius* are similar in pappus color, head size, and leaf glands, they differ markedly in several other features such as style-branch morphology, capitulescence type, and flavonoid complements. The latter species appears to be closely allied to *E. cooperi* (Urbatsch, ined.). The affinities of *E. parrasana* are not readily apparent. Its flavonoids are more like those of *E. palmeri*. Clearly more study is needed before the relationships of *E. parrasana* are known with certainty.

3. **ERICAMERIA LARICIFOLIA** (A. Gray) Shinnars, Field and Lab 18:27. —*Haplopappus laricifolius* Gray, Pl. Wright. 2 (Smithsonian Contribution Vol 5, art. 6): 80. 1853. TYPE: U.S.A.: NEW MEXICO, Hidalgo Co.: Guadalupe Pass, 5 Oct 1851, *Wright*, accession number 1188 (HOLOTYPE, GH!; ISOTYPES, MO! US!). *Aster laricifolius* (A. Gray) Kuntze, Rev. Gen. Pl. 318. 1891. *Chrysoma laricifolia* (A. Gray) Greene, Erythea 3:11. 1895. *Bigelowia nelsonii* Fernald, Proc. Amer. Acad. Arts 36:505. 1901. TYPE: MEXICO: CHIHUAHUA: Sierra Madre, 29 Sep. 1899, *Nelson 6494* (HOLOTYPE, GH!; photos of the type NY! UC!). *Ericameria nelsonii* (Fernald) Blake, Contr. Gray Herb. 52:26. 1917.

*Ericameria laricifolia* ranges from eastern San Bernardino Co., California

to Mohave Co., Arizona southeastward to northeastern Sonora, Mexico and Presidio Co., Texas. This species is often locally common, usually growing in stony soils of foothills and from crevices of canyon walls, 600-2500 m. Flowering is from mid-September into November; occasionally a few somewhat larger vernal heads are produced in April and May. *Ericameria laricifolia* is not closely related to the other Chihuahuan Desert species, but is allied to the California species, *E. pinifolia* and *E. brachylepis*.

Representative Chihuahuan Desert region specimens examined: MEXICO: CHIHUAHUA: mtns., near Ciudad Juárez, 1911, *Stearns s.n.* (NY); SW slope of Sierra de la Ranchería (on Rancho Candelaria) from the top down to a marble quarry at base, 31° 01'N, 106° 21'W, elev. 1500-2180 m, among steep crumbly slopes of extrusive igneous rock, 29 Oct 1972, *Chiang, Johnston, & Wendt 9950* (LL). NEW MEXICO: Grant Co.; collected on Bear Mt., near Silver City, elev. 6000 ft., 19 Sep. 1903, *Metcalfe 748* (ARIZ, GH, MO, NY, UC, US); Doña Ana Co.: Organ Mts., 18 Oct 1903, *Wootton s.n.* (ARIZ, MICH, NY); Hidalgo Co.: granite wash, N end of Big Hatchett Mts., 18 Aug 1954, *Castetter 9372* (SMU); Luna Co.: Filonda Mts., S slope, alt. 5800 ft, 8 Sep 1908, *Goldman 1485* (US); TEXAS: El Paso Co.: on mtns. above McKelligon Canyon, Franklin Mts., shrub about 3 ft tall, 16 Oct 1952, *Correll 15076* (LL, SMU, US); Presidio Co.: infrequent shrub on flats above Oso Crk., northside Chinati Mts., old Woods ranch, 18 mi NW of Shafter, 10 Nov 1946, *Hinkley & Warnock 46961* (GH, MO, TEX, UC).

4. **ERICAMERIA TRIANTHA** (Blake) Shinnery, Field and Lab. 19:133. —*Haplopappus trianthus* Blake, J. Wash. Acad. Sci. 28:485. TYPE: U.S.A.: Brewster Co., frequent along road from Study Butte to Terlingua, Chisos Mtns. area. 31 Aug 1937, *Warnock 1126* (HOLOTYPE, US!; ISOTYPE, LL!).

*Ericameria triantha* occurs from Brewster Co., Texas southward throughout most of Coahuila, eastern Chihuahua, northeastern Durango, and northwestern Nuevo León from 700-1500 m. It is locally frequent in gypsaceous, calcareous, or saline habitats with gravelly to fine alluvial soils and flowers August to October and to some extent throughout the entire year.

The nearly vertical alignment of phyllaries of *E. triantha* suggests that it may well belong in the genus *Chrysothamnus*. However, anatomical studies by Anderson (1970) show that *E. triantha*, unlike *Chrysothamnus*, has the well developed secretory canals in its achenes and corollas characteristic of species in *Ericameria*. The flavonoid complement of *triantha* is most similar to that of *E. diffusa* (a species centered in Baja California) which Blake (1938) had suggested as its closest ally (Urbatsch, ined.).

Representative specimens examined: MEXICO: COAHUILA: west side of Laguna del Rey; 18 Oct 1971, *Bacon & Leverich 1197* (TEX); Laguna Salada, salt flats about lake; 11 Aug 1967, *Cole, Minckley & Pinkava 3645* (ASU); 6 mi W of La Víbora on small gypsum knoll near railroad, in Bolsón de Mapimí region of Chihuahuan Desert; 21 Sep 1972, *Henrickson 7868* (LL); 10 mi S of Castillón, 12 Aug 1970, *Johnston & Muller 195* (CAS, GH, LL, MICH); CHIHUAHUA: road from Castillón to Mula, via S. Salvador and Pirámide, 4 mi N of Mula; 21-22 Sep 1940, *Johnston & Muller 1439* (GH, LL); 5 mi E. of Carrillo, municipio de Jiménez; 15 Sep 1939, *Muller 3319* (GH, MICH, TEX, UC); DURANGO: road from Bermejillo to Zaragoza and north to Mohovano, 31 mi N of Zaragoza; 20 Sep 1938, *Johnston 7799* (GH, UC);

NUEVO LEON: 3 km from El Milagro and 10 km from Icamole on winding rd. between, 25° 55' 30"N, 100° 47'W, 720 m, 5 Jul 1973, *Jonston, Wendt, Chiang 11612* (LL); U.S.A.: TEXAS: Brewster Co.: near Hot Springs, Big Bend Nat'l Park, limestone flag hills; 13 Sep 1961, *Correll & Jonston 24557* (LL, UC).

5. *ERICAMERIA PURPUSII* Brandegee, Univ. Calif. Publ. Bot. 4: 191. 1910. TYPE: MEXICO: COAHUILA: Cerro de Macho, June 1910, *Purpus 4479* (HOLOTYPE, UC!) *Haplopappus purpusii* (Brandegee) Blake, Contr. U.S. Natl. Herb. 23: 1491. 1926.

*Ericameria purpusii* is distributed from western Coahuila and southwestern Chihuahua south to central Durango at 1100–1200 m. It is sometimes locally frequent but usually uncommon on limestone hills, and sometimes in gypseous soils; it flowers in May and Aug-Sep.

The singularity of this species is manifest by its acicular, non-resinous leaves, and unique flavonoid complement (Urbatsch, ined.). *E. purpusii* is not readily accommodated in any existing genus, but its habit, involucrel and pappus features, and chromosome number,  $n=9$ , place it closest to *Ericameria*. No useful purpose would be served by erecting a monotypic genus next to *Ericameria* for this taxon.

Hall (1928) doubtfully assigned *E. purpusii* to *Haplopappus* sect. *Asiris* (a taxon centered in the Rocky, Sierra, and Cascade mountains) based mainly on a single technical feature, lack of impressed resin pits. However, corolla and style branch features and consideration of its geographic occurrence place it closer to the other Chihuahuan Desert species of *Ericameria*.

Additional specimens examined: MEXICO: CHIHUAHUA: southern part of Las Pampas Ranch, Preson El Lindero, 27° 13' 30"N, 104° 42'W, 1650 m, 26 Aug 1972, *Chiang, Wendt, Johnston 8936H* (LL); 6 km ESE of Rancho Chupaderos in the western part of the Sierrita del Rosario, 27° 10' 30"N, 104° 37'W, 1575 m, 29 Aug 1972, *Johnston, Wendt, Chiang 8984* (LL); COAHUILA: 5.5 mi E of Los Americanos, 27° 10'N, 103° 15'W, 1080 m, 2 Sep 1972, *Chiang, Wendt, Johnston 9117* (LL); ca. 29 rd. mi ESE of Esmaralda, 27° 10'N, 103° 17'W, 20 Sep 1972, *Hendrickson 7846* (LL); road from San Antonia de los Alamos, 30 km E through low limestone hills to Buenavista, ca. 27° 30'N lat., W of Buenavista, 21 Aug 1941, *Johnston 8308* (LL); S of Laguna de Leche, 30 Aug 1941, *Johnston 8614* (LL); S of Matrimonio Viejo, 22 Sep 1941, *Johnston 9365* (LL); E of Americanos, 23 Sep 1941, *Johnston 9380* (LL); 2.5 km WNW of Hacienda Zacatosa, 27° 02' 30"N, 102° 46'W, 1225 m, 7 May 1973, *Johnston, Wendt, Chiang 10906* (LL); 7.5 km N of Rancho Presa de Lumbre on rd. to Zacatosa, 27° 59'N, 102° 53' 30"W, 1225 m, 7 Aug 1973, *Johnston, Chiang, Wendt, Hendrickson 12105* (LL); DURANGO: 52.5 km W of Ceballos on rd. to Villa Hidalgo, a few km due S of Buen Día, 24° 19'N, 104° 30'W, 1400 m, 31 Oct 1972, *Chiang, Wendt, Johnston, 9984* (LL).

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